MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

PBM0045 – MATHEMATICS
(Foundation in Management / Foundation in Business)

16 OCTOBER 2017
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 3 pages with **FIVE** questions.

2. Attempt **ALL** five questions. The distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

Question 1

a.   Perform the indicated operations and simplify.

        i. $\left(\dfrac{x^2 y^{-1} z^3}{x^3 y^{-2}} \right)^2$ (2 marks)

        ii. $\dfrac{1 + \dfrac{6}{x}}{\dfrac{1}{x} + \dfrac{2}{x^2 + 4x}}$ (2 marks)

b.   Rationalize the denominator for: $\dfrac{-4}{1 + \sqrt{3}}$ (2 marks)

c.   Solve the followings:

        i. $\dfrac{2}{x-1} + \dfrac{5}{x+1} = \dfrac{x^2 + 11x}{x^2 - 1}$ (3 marks)

        ii. $|2 - 6x| > 10$ (2 marks)

        iii. $\sqrt{x + 7} + 2 = \sqrt{3 - x}$ (6 marks)

d.   Determine the domain of each function:

        i. $g(x) = \dfrac{\sqrt{x - 2}}{x - 3}$ (2 marks)

        ii. $f(x) = \dfrac{2}{2x^4 + x^2 - 1}$ (2 marks)

e.   Find the vertex and intercepts of the function:

        $y = 2x - x^2 + 3$ (4 marks)

                                              (Total = 25 marks)

Continued…

Question 2

a. In an arithmetic progression, the sum of the first ten terms is 50 and the fifth term is three times the second term. Calculate the first term and the common difference for the progression.   (6 marks)

b. The third term of a geometric progression is 16. The sum of the third term and the fourth term is 8. Find the first term and the common ratio of the progression.

(6 marks)

(Total = 12 marks)

Question 3

a. Matrix A is given by $A = \begin{bmatrix} 3 & 2 & 6 \\ 0 & 4 & -3 \\ 6 & 0 & 1 \end{bmatrix}$.

Find the determinant and adjoint of A. Hence, find A^{-1}.   (8 marks)

b. Mary and her friends are watching a movie together in the theater. At the concession stand, Mary paid RM18 for two regular popcorns and a regular soft drink. Her friends paid RM33 for three regular popcorns and three regular soft drinks.

i. Write a system of linear equations to represent the above information.

(1 mark)

ii. Determine the price of a regular popcorn and a regular soft drink by using the inverse of coefficient matrix.   (4 marks)

(Total = 13 marks)

Continued...

Question 4

a.   Find $f'(x)$ for the given functions and simplify the answers.

     i. $f(x) = 4x^{\frac{3}{8}} - \dfrac{12}{25x^5} - \sqrt{\sqrt[3]{x^6}} + 3\pi^5$ (3 marks)

     ii. $f(x) = 2x\left(6x^4 + 13\right)^{-3}$ (5 marks)

     iii. $f(x) = 3 - \left[\dfrac{2x^2 + 5x}{\left(x^3 - 2\right)^3}\right]^2$ (7 marks)

b.   Given $y = 4u + \dfrac{1}{u}$ and $x = 2u - \dfrac{2}{u}$.

     i.   Show that $\dfrac{dy}{dx} = \dfrac{(2u-1)(2u+1)}{2(u^2+1)}$.   (5 marks)

     ii.   Find the value of x and y when $\dfrac{dy}{dx} = 0$, $u > 0$.   (5 marks)

(Total = 25 marks)

Question 5

Evaluate the following integrals.

a. $\displaystyle\int_{-2}^{0}\left(x^5 - x^3 + x^2\right)dx + \int_{0}^{1} x\left(\sqrt[3]{x} + \sqrt[4]{x}\right)dx$ (5 marks)

b. $\displaystyle\int\dfrac{10x^3 - 5x}{\sqrt[5]{\left(x^4 - x^2 + 6\right)^2}}dx$ (6 marks)

c. $\displaystyle\int x\left(x^2 + 2\right)\left(x^2 - 2\right)^9 dx$ (7 marks)

d.   The rate of depreciation (in Ringgit per year) for a certain truck is given by

$$f'(t) = \frac{6000(0.3 + 0.28t)}{(1 + 0.3t + 0.14t^2)^2}$$

     where t is in years and $t = 0$ is the year of purchase. Find the total depreciation at the end of 3 years.   (7 marks)

(Total = 25 marks)

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